Editor's Page

I remember the first time I picked up a gun. As a youngster, I was rummaging around in a closet for hidden Christmas presents and came across my Dad's handgun, a black-holstered relic of the Korean War. Mother had a cow when she found out I had uncovered its hiding place. I got the typical "Never touch that again, it's a horrible thing," rhetoric from a peaceable woman who had never held a gun. Scared me good, but I'm not sure that I learned a whole lot about guns from it. Years later, a college professor gave me my first hunting lessons. One afternoon while out bird hunting, I inadvertently shot over his dog. I was promptly sent back to the truck for the rest of the afternoon to think over the mishap.

It was simply luck that I was introduced into hunting at the hands of a safety-conscious instructor. It easily could have been different. How many times have I been hunting with people who are ignorant to the most elementary of safety measures, such as never climbing a fence with a loaded gun? And it has paid off. Hunting for the first time with a friend a few seasons back, he turned around while walking in front of me through the woods. "You know," he said, "I feel *safe* hunting with you." That was quite a compliment from someone whose back was vulnerable to a mishandled gun.

Still, like I said, it was luck. Because, 13 years ago when I received my first lessons in hunting, Virginia's hunter safety program was just revving up, and there weren't many places you could go to take advantage of the voluntary course. Today, it's different. Legislation passed by the General Assembly has made a 10-hour hunter safety education course mandatory for all new hunters and those between 12 and 15 years old.

Now that we're in the first year of the mandatory program, though, it's starting to come out that not everyone is thrilled by the inconvenience of the requirement. That puzzles me. Oh, I'm sure that it's hard to squeeze three nights of classes into a kid's schedule that includes marching band, swimming, and karate. Tempers get short when folks realize that the courses aren't given to suit their own needs. Still, I'm not sure they realize what we're dealing with here.

Terror might help. Realizing how dangerous a firearm is when improperly handled may scare parents into giving a hunter education course the priority it deserves. Show them the man who became a hunting accident statistic last season when a single buckshot pellet penetrated his brain from a shot that was fired from over *200 yards* away *after* it killed a big buck, and you'll have them shuddering to think how much they don't know about firearms.

Still, that's not enough. Hunting deserves so much more than respect out of simple fright. In Switzerland, a friend tells me, it can take *years* to gain the privilege of obtaining a hunting *or* fishing license, because it requires the completion of college-like courses not only in the hunting sports, but in wildlife management and ecology as well. There, the right to hunt, undoubtedly, is a privilege.

I'm not sure how many people here in Virginia, however, take the sport that seriously. I know that some people believe it to be a crime and others view it simply as a recreational sport, and the rest of us have been spoiled with the freedom to hunt where and how we wish. So, I wonder how many of us give it the respect it deserves.

I do know that the more *I learn* about hunting and shooting sports in general, the more my respect for it all grows. I've learned that first-rate shooting instruction not only improves your shooting ability, but teaches you to trust yourself. Skeet shooting makes you depend on your instincts to succeed. Rifle practice hones your concentration abilities and teaches discipline. Those skills mean a whole lot more than simply being a good shot.

But still, accuracy in the field is (after safety) the first priority. Henry Baskerville, an exceptional teacher in the shooting sports and international big game guide, tells a story of the best rifle shot he knows. The man can hit prairie dogs offhand with a 22-250 rifle at 150 yards without a miss. But, he will not shoot offhand at big game. "The animal deserves my best shot," he says. And, every time, he will find a rest to make it his best. He has perfected his skills out of respect for the sport.

It boils down to learning, to the perfection of skills, that makes a good hunter even better. And so, I feel, that mandatory hunter education in Virginia is more than a way to keep us safe in the woods. It's a way to develop the respect that our wildlife deserves.

Charlie Baskerville sat in his father's lap at five years old and fired off a 22 magnum rifle at a steinbok in Africa. At six years old, with his father's arms around him, and instructions whispered into his ear, he killed his first whitetail. His father never left his side.

Young Charlie has a jump on most of us hunters. Personally, that just means I've got to work harder to catch up to him. But, it's not too late. Besides, the education never ends.

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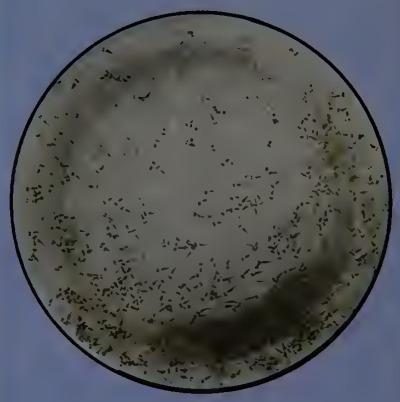
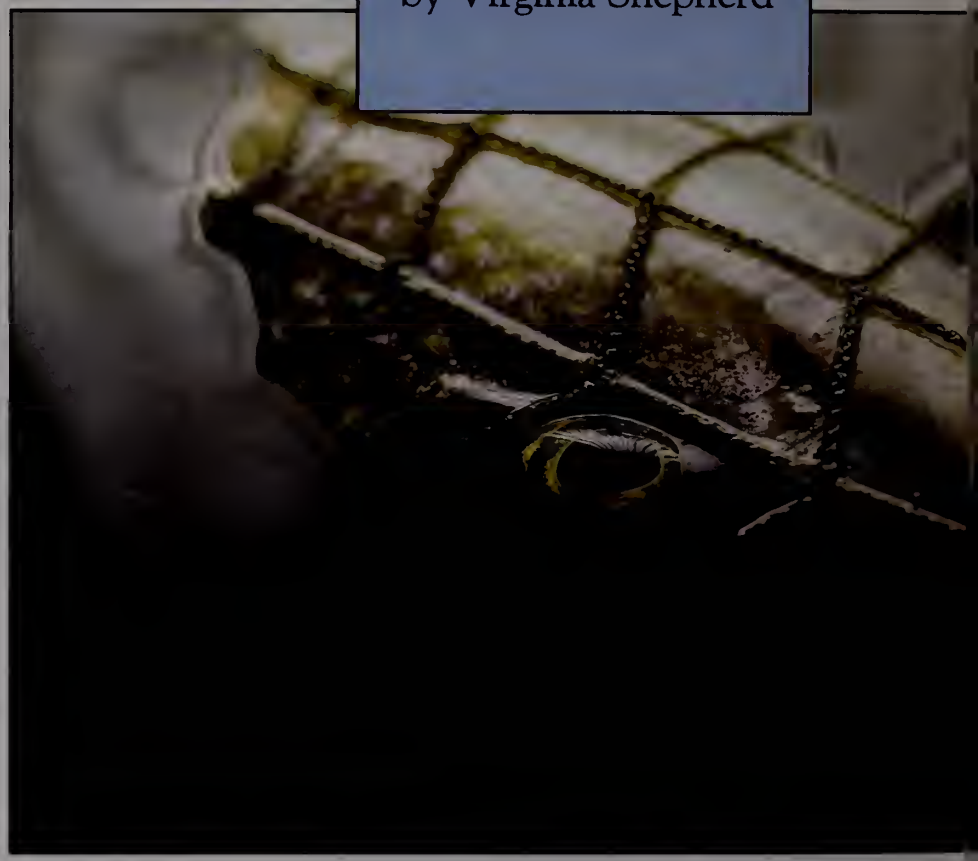
Making Babies

(striped bass, that is.)



by Virginia Shepherd



April 19, 1988, Mattaponi River. Weather report: Rain and snow. Temperature: High, 53 degrees. Low, 37. Winds out of the north to northeast at 12 m.p.h. Visibility: 1⅜ miles.

Nobody in their right mind would be out on the water that day. It was snowing and sleeting on the river, and a queer mist was rising from the water that had warmed up from a couple weeks of high temperatures. But, the stripers were spawning, and Game Department fisheries personnel Tom Gunter, Fielding Tanner, Patrick Melvin, and Ken Webb were out there with their gill nets, hoping that they'd get into rockfish heavy with eggs, ready to spawn.

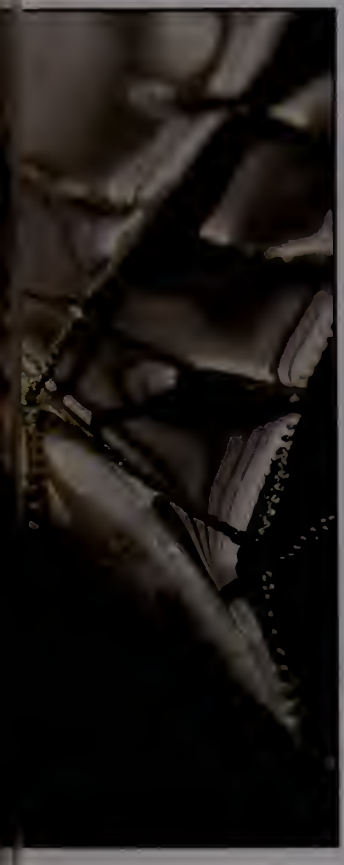
But to tell the truth, it was all pretty discouraging. Not only was it a miserable day, but for the past month, the men had struck out trying to find brood fish, even though the boys up in Maryland were netting ripe stripers right and left. It had been two years since the declining striped bass populations in the Chesapeake Bay had prompted the Cooperative Agreement between the U.S. Fish and Wildlife Service, the Marine Resources Commission, the Virginia Institute of Marine Science (VIMS), and the Virginia Department of Game and Inland Fisheries. It had been two years since the plans were optimistically made for capturing striped bass on their spawning runs up Virginia's tidal rivers in order to rear and restock up to 50,000 fingerlings per year, and so far, the cooperative Virginia experiment had been one big flop.

Plus, time was of the essence. Although scientists have warned of declining striped bass populations since 1924, it wasn't until the commercial catches of the anadromous fish hit an alarming low in 1979 and continued to drop every year thereafter, that people realized the fish, and especially adult fish, were really in trouble.

The striped bass *(Morone saxatilis)* originally ranged from Canada to Florida, and from the Gulf of Mexico in West Florida to Louisiana. It has since been introduced and established sustaining populations on the West Coast, from British Columbia to Ensenada, Mexico, and also in the Soviet Union,

The Department of Game and Inland Fisheries is the lead agency in a nine-year experimental project to restore Chesapeake Bay striped bass populations through artificial spawning and restocking.

Top left: Tiny striped bass fry, no more than a few days old; **Below left:** *Netted striped bass, ready to be transferred to a spawning tank;* **Below:** *The hormone gonadotrophin is used to induce ovulation in striped bass females;* **Bottom:** *Fish Cultural Supervisor Joe Gray checks the ripeness of a sample of striped bass eggs; photos by Lynda Richardson.*



France and Portugal. And that doesn't count the five to six landlocked freshwater reproducing populations, and the untold numbers of non-reproducing fish that have been stocked here in the U.S. to produce excellent sportsfisheries in lakes and reservoirs across the country.

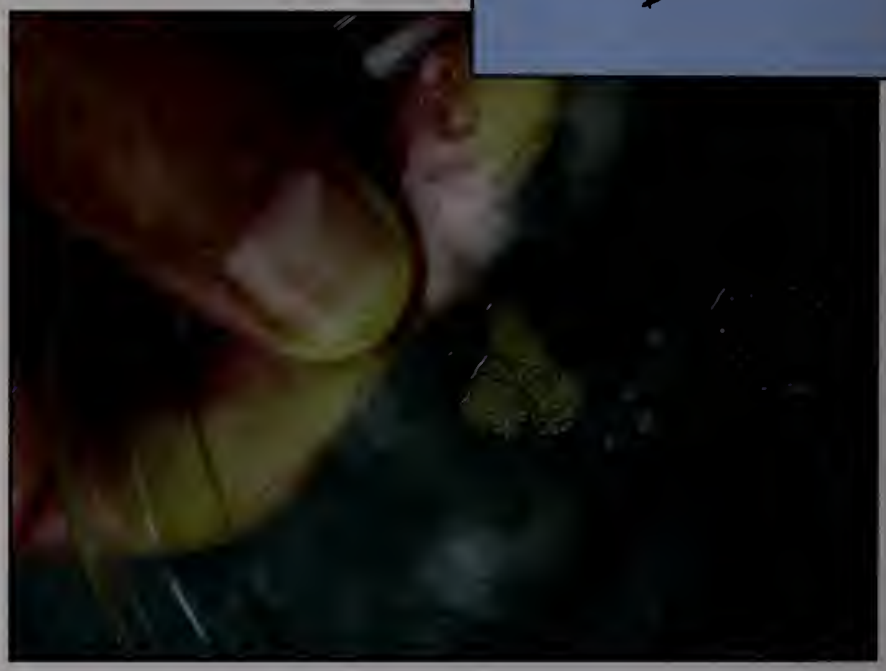
No one would dispute the fact that the striper is a much loved fish. Sportsmen love it for its fight, for its size, and for its challenge, and commercial fishermen find striped bass in high demand on the market. But the fish is wonderful in itself. It adapts to saltwater, brackish water, and fresh water miraculously, and thrives in any one of them. A fish with a migratory bent, the populations from Cape Hatteras, North Carolina to New England leave the rivers of their birth after two or three years for the open ocean, joining coastal migrations that move north in the summer and south in the fall and winter. When they turn between six and eight years old, the females will return uncannily to the rivers they grew up in to spawn. Once they throw their sometimes more than a million eggs per female, and the 50 or so males surrounding each female fertilize them, the females will return to the ocean, leaving their offspring to fend for themselves in the rivers for the next two or three years.

Strangely enough, however, striped bass populations in the Gulf of Mexico, from southern North Carolina to Florida, and those in the St. Lawrence River, do not venture much outside the estuaries of their birth. They are largely riverine populations, and although the same species, they have adapted to a sedentary life, one that doesn't include much travelling outside the protected sounds and bays of their native rivers. And there's one more surprise for those who think they've figured out the species. You have the landlocked stripers in the Kerr Reservoir in Virginia and other similar bodies of water in the South, fish that have been stocked or trapped by dams from swimming back out into the estuaries and sounds. And, even these fish have adapted to this unnatural freshwater situation, by continuing their spring spawning run

upriver and maintaining reproducing populations.

Still, the striper's wonderful adaptive ability has failed to safeguard its survival under the stress of sedimentation, pollution, wetlands reclamation, dams, pesticides, radioactivity, and heavy exploitation of this century. The coastal fish, undeniably, is in trouble. In 1981, the commercial catch of striped bass dropped from a record harvest in 1973 of 6,335 metric tons to 1,740 metric tons. And, since scientists believe that over 90 percent of the coastal striped bass fishery from Maine to Cape Hatteras originates in the Chesapeake Bay tributaries, it was critical that some protective and corrective action be taken by those states bordering the Bay, if we wanted the fish to survive.

So, first of all, commercial and recreational catch limits of stripers up and down the coast were severely reduced. Then, in 1985, Maryland entered into a nine-year cooperative agreement with state and federal agencies in an effort to restore striped bass populations by artificial spawning, rearing and restocking. No one had any idea if this restocking experiment would boost striped bass populations, but it was worth a try, since it is believed that one weak link in striped bass survival is in the egg to larvae stage. If hatcheries could help the fish get through the critical stage, then it was hoped that most of the stocked fingerlings, 4-6 inches long, would survive to adulthood and reproduce. In any case, the biological information gained from tagged fish, if they survived, would be invaluable for the future management of the species.



Above: Fish division personnel Bennie Carlton and Ken Webb sacrifice netting to quickly untangle a Chesapeake Bay striper that will be transferred to Brookneal hatchery for spawning; photo by Virginia Shepherd. **Right:** *Egg samples from striped bass females. The sample on the right is closer to ovulation; photo by Lynda Richardson;* **Far right:** *Once netted, Chesapeake Bay striped bass are measured, their weights estimated, and their eggs "staged" before being transferred to the tank that will take them to the Brookneal hatchery for spawning; photo by Virginia Shepherd.*

And, the preliminary results so far are encouraging. In 1986, Maryland tagged and released 360,000 hatchery-reared striped bass fingerlings in their parent rivers. So far, capture of the 1986 tagged fish has revealed that the hatchery contribution has been significant to the striped bass population of the Patuxent River and that many of these two-year-old fish are already migrating as far north as New York, Connecticut, and Massachusetts.

Thus, when Virginia signed its own cooperative agreement with federal and state agencies in an effort to aid striped bass restoration with an experimental artificial spawning, stocking, and tagging program, there was an air of optimism surrounding the project. VIMS was named the lead agency due to their scientific expertise and exten-

sive experience with the Chesapeake Bay and Virginia's tidal rivers. Their first responsibility was to capture the stripers on their spring spawning run. The Game and Fish Department would then take charge of the next phase of the project and artificially spawn the stripers at their highly successful Brookneal warmwater hatchery, raising the fry just past hatching stage and subsequently delivering them to federal hatcheries for rearing to 4-6 inches. By raising the fish to this substantial size, tags could then be placed on the young stripers before they are returned to their rivers of origin, helping VIMS track and analyze the success of the project.

But, the first two years of the project produced no fish. No scientific effort is easy, but this one wasn't made any easier by the extensive flooding of Virginia's rivers in 1987 right in the

middle of the spawning run, and other problems that invariably accompany any first-time project. So, it was decided that the time had come to regroup. The Game and Fish Department was assigned the lead in the project, and assumed responsibility for the capture of brood stock from the York River drainage. And, in February of this year, Regional Fisheries Supervisor Mitchell Norman, Fish Biologist Tom Gunter, King and Queen Fish Hatchery Manager Fielding Tanner and his crew, Wes Dolvin, Eugene Gwathmey, and Bennie Carlton, along with two summer assistants Patrick Melvin and Ken Webb, found themselves gathering up nets, microscopes, and lining up the use of the U.S. Fish and Wildlife Service's new 18-foot electroshocking boat. The countdown was on for the 1988 spawning run.

But stripers can fool people, just as they've always done, and collecting Chesapeake Bay stripers proved to be more difficult than it sounds. Sure, for the past 20 years, the Game Department has perfected its techniques with the collection of landlocked striped bass making their spawning run up the Roanoke River, and every spring the Brookneal Striped Bass Hatchery produces from 15 million to 18 million larval striped bass each year in a process that begins with the capture of brood stock, and ends with the stocking of striper young in reservoirs across Virginia and the country. But, even though it was possible to use the experience gained from Brookneal, and to learn from the similar and successful operation going on in Maryland, every river system is different. After all, did anyone even know exactly where the fish in Virginia's rivers were spawning?

Well, no. Although one paper, published in 1952, documented the presence of eggs at several sites on the Pamunkey, Mattaponi, James, Rappahannock and Chickahominy Rivers, the data couldn't be counted on to produce stripers. It was like an old commercial fisherman told Tom Gunter one day, "Stripers are just like wild turkeys—they're here one day and gone the next." No one in the Fish Division actually *knew* where the best place was to catch brood fish, but still they couldn't risk losing another spawning season simply running up and down rivers casting about for them.

So, with a cushion of three to four weeks before and after the recorded Maryland spawning runs, they began their search for fish. They set out on March 14, taking water quality samples, and netting here and there, trying to locate the so-called "salt wedge," where the salt water meets the fresh in a tidal system. For some reason, this magical area seemed to be where the Maryland crew was finding most of their fish, and it was a good idea to look for the Virginia fish in the same place. But, not only did they not fail to locate the salt wedge that day, they didn't catch anything but one catfish. "And we wished we hadn't caught that," said Tanner, shaking this head.

Still, the stripers wouldn't stick around long, and the crew knew it. That's why they stayed on the water all day, kept the boats out all night and watched the dawn hit their nets. But, for a month, nothing happened. They'd catch a few "green" females, a boatful of small male stripers, or they'd suffer the humiliation of pulling in empty nets while guys with spinning gear would be pulling up fish.

Or, the weather would turn on them. On a freezing March 17, having netted only males, a frustrated Gunter theorized that a cold spell had driven back to the Bay the females that were moving upriver to spawn. "I told my secretary," said Gunter, "it was just like a bunch of males to stay up in the cold waiting for the women to come on."

Finally, after a month of pulling in nets with bonefish and herring and carp or nothing at all, they got into 'em. Big time.

It was freezing again on April 19th. Ken Webb and Patrick Melvin were pulling in nets with numb fingers, blowing on them to keep them working. They met up with Bob Batky with the U.S. Fish and Wildlife Service at noon and heard the news. They had shocked a female striper pushing 50 pounds, and she was ripe. Gunter, Tanner, Melvin and Webb gunned the boats back upriver. They were just above the salt wedge and they found the brood fish. They netted until dark and caught three females on the changing tide, the largest of which was 35 pounds. And they sent them on to Brookneal, along with 10 males. The boys were elated.

The next morning the crew was back on the river. This time, they caught seven fish, three males and four females, in one set. "Feeesh!" came the yell from Webb and Melvin, pulling in the nets. "They're pairing up, now," a grinning Tanner shouted over the

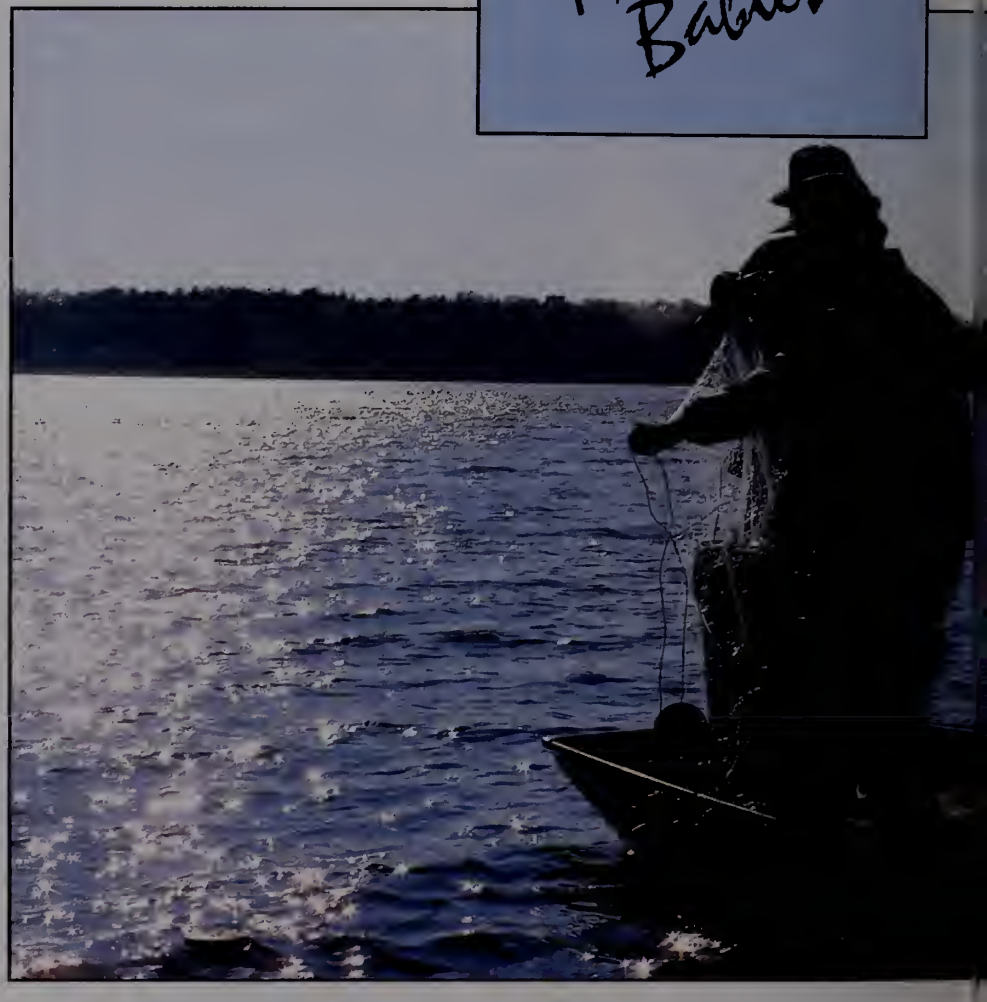
motor as he and Gunter drove the boat back to the dock with the fish to "stage" them. Pulling out the microscope, Gunter took a sample of eggs from each female and recorded the time till ovulation of the eggs. If the eggs were too underripe, too "green," the fish would be released. If, however, the eggs were within an acceptable range for artificial spawning, the fish would be transferred to an oxygenated tank with a saline solution to reduce stress, and shipped at dark to the Brookneal hatchery three hours away.

The spawning tanks at Brookneal quickly filled with Chesapeake Bay stripers bigger than any Roanoke River stripers the hatchery had ever spawned. When the count was over, 35 female stripers and 70 males were spawned, the largest of which was a 60-pound female. The first critical problem of the restoration experiment had been solved. Still, as with any scientific experiment, no matter the type, the problems keep coming, and it was the boys at Brookneal who had the next one on their hands.

"The eggs are rupturing," said Steve Arthur, Brookneal Hatchery Manager. "We're not sure why, but these eggs are different than the ones the landlocked stripers throw. They're more buoyant, and once the water gets into them, they burst." It was just another piece of evidence supporting the adaptibility of the striper, only this time, it was causing the people trying to help the striper major headaches. It's long been documented that the coastal, migratory striper egg carries more oil in its yolk sac than the non-migratory strain, making the eggs much more buoyant. And, it is theorized that this is an adaptation to the type water each fish spawns in. The non-migratory strain spawns farther upriver in more fast-moving water and its egg will float downriver with the current, never incurring the danger of settling on the bottom and suffocating. The migratory rockfish strain, however, spawns a more buoyant egg, in order, it is thought, to assure flotation and survival of eggs in the more slow-moving tidal rivers they are deposited in.

But this adaptation was only hurting Brookneal's attempts at artificial spawning. Reasoning that perhaps with saltier spawning tank water, closer to the salinity of the water these eggs are naturally found in, they might keep the eggs from taking on so much water and bursting, the Brookneal crew added salt to the spawning tanks, and the problem was lessened. They still had egg shell rupturing, but they were also hatching a whole lot of Chesapeake Bay stripers.

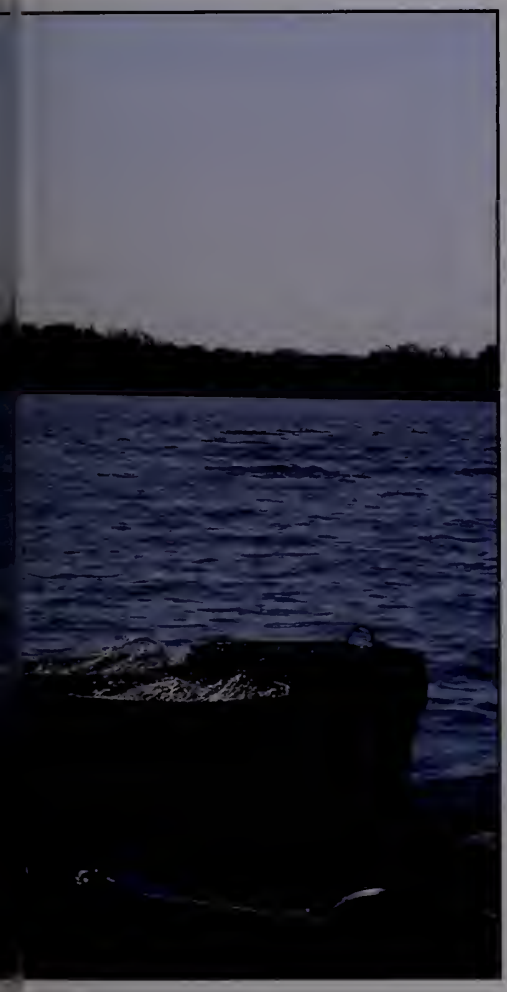
A month later, the Brookneal crew had raised 2.3 million five to six-day-old fry for shipping to federal hatcheries for rearing to the Phase II stage, a process that would take four to six more months. Out of these 2.3 mil-



There were too many days of "water hauls," or empty nets, the first several weeks of this year's striped bass collection efforts in Virginia's tidal rivers. But the persistence paid off, and more than 105 stripers were spawned and more than 2 million Phase I fry produced at the Game Department's Brookneal Hatchery; photo by Virginia Shepherd.

lion fry, it is hoped that at least 50,000 fingerlings of the 4-6 inch size will be tagged and restocked into the rivers their parents were caught in six months before.

Eight hundred and twenty-five thousand fry were shipped to the U.S. Fish and Wildlife Service Harrison Lake National Fish Hatchery in Charles City County, the only fish hatchery in the country that has devoted all its resources to the Chesapeake Bay striped bass restoration program. There, on a hot day in May, Alan Blair, Hatchery Manager, was checking on his charges. "We handle fish from Maryland and Virginia," said Blair, "and today, we'll be draining a



pond of Maryland fish that have been raised to the Phase I stage." These fish are of the Chesapeake Bay strain, but are kept in separate rearing ponds from the Virginia stripers, and were being collected and counted so that Blair's crew could figure out how much to feed them once they were restocked for raising to the Phase II stage. "We try to feed about 2-3 percent body weight, about three to four times a day. These fish go on artificial food pretty easily." The fry raised at Brookneal and at Harrison Lake initially feed on natural food, zooplankton, until they are about 5-6 weeks old. After that, they have to be artificially fed, or they'll starve to death.

Blair feeds his young fish the same stuff that hatchery-reared trout eat, Purina Trout Chow, and it isn't cheap. "I wouldn't be surprised," says Blair, "if we don't go $8-10,000 in feed this year if we get all the ponds filled up."

Seven of his 21-acre ponds have Virginia Chesapeake Bay stripers in them. "It seems like these Chesapeake Bay fish are a lot more sensitive to handling than the landlocked stripers," says Blair. "Plus, the eggs are different, and they spawn differently. But you can't tell that by looking at them."

Putting four more inches on these stripers is not easy, either, especially in ponds. There's a lot of maintenance involved. "You're a lot better off rearing your fish in raceways," says Blair, "which seems to be the way this business is going, especially with Phase II fish. That's because you can't control what's going on in the ponds." Blair refers to the algae problems all warmwater ponds are cursed with in our hot Virginia summers, algae that makes the collection of fish difficult, and causes oxygen depletion problems when it's treated with chemicals. And then, of course, you have the disease problems which invariably afflict fish populations. "In raceways," says Blair, "if you've got a problem, you can pick it up right away. In ponds, you don't see that these guys have got a problem until it's too late, until it's too severe to take care of."

The one problem hatchery managers are having to overcome with raising stripers in raceways, however, is an unexpected one. Stripers, it turns out, are a rather nervous sort. "You put 'em in a concrete tank with people walking up and down by them all the time, and that bothers them," says Blair. "It doesn't bother a trout, but it sure bothers a striped bass." Thus, this year in West Virginia, where the folks are raising stripers in raceways, they may just put covers over them to see if it helps reduce stress on the fish.

Hopefully, by next year, the Game Department's warmwater hatchery at Stevensville will be outfitted to handle the Chesapeake Bay brood stock for artificial spawning, to further eliminate stress on the fish and streamline the Virginia operations. But this year, beginning in October, the Game Department will tag all the surviving 4 to 10-inch stripers raised at Harrison Lake, and two other federal hatcheries with a binary coded micro-wire tag that is inserted with a hypodermic needle-like gun into the cheek of each striper. It is a tag that fishermen will not be able to detect, but that VIMS will be able to record once it starts its trawling collection of stripers as part of the project next year. The young stripers will then be returned to the rivers of their parents.

But it's an experiment, that's the important thing to remember, this nine-year cooperative agreement of Virginia's state and federal fishery agencies. As Mitchell Norman, Project Leader of the striped bass restoration program for the Virginia Game Department put it: "We don't anticipate that hatchery culture and subsequent stocking of striped bass in our tidal rivers will ever replace natural reproduction. But, it's worth a try in the effort to restore the Chesapeake Bay striped bass population. It is far too important a resource to lose."

And this experimental project, in conjunction with other programs designed to undo the environmental damage that we are responsible for, may just put the Chesapeake striped bass back on the road toward restoring its own numbers. At any rate, the knowledge we are gaining now with this project has already made the long hours in miserable weather worthwile. It has been a group effort of cooperation between state and federal agencies, one that underscores the importance and the commitment to *doing* something about a problem that can't be solved by one agency alone. And that in itself is cause for hope for the great striped bass. □

It's Not A Glory Job.

A game warden's job is tough, requiring long hours, hard decisions and good judgment. It's not a piece of cake.

by Sgt. Cameron Gray

It's cold on a late November morning at 3:00 a.m. in a darkened car with the window open. It's also monotonous staring out of the window counting the stars for the twentieth time. You listen to the infrequent calls on the police radio which is turned way down so you can hear something unusual in the wind. And you hope that a car or truck will come down the road that you are staking out, if for nothing more than to relieve the boredom. But most of all, you pray that the next car will be the one that you have been looking for—your car. The one you have earned through countless hours and nights of freezing and listening and staring and praying.

Four a.m. rolls around and still you sit and stare. Not one car has driven through to let you know that the world is still turning. So you go back to your star counting and wish that you could just turn on a light to read.

Four-thirty a.m. The sound of an automobile or truck drifts in with the light wind. It's still a long way off, but it's coming your way. As all senses become attuned, your adrenaline tells your brain, "Get ready, maybe this is him." Then the headlights of a pickup come into view. But he drives on past without swerving or slowing, and you watch his taillights disappear down the road to your right. False alarm.

Four-forty a.m. and your senses begin to unwind. The world still turns.

Opposite: photo by Lee Walker.

Every night, from November through mid-March, this scene is taking place somewhere in Virginia as a game warden watches for "spotlighters" attempting to kill deer illegally.

The hours are arduous, the responsibilities are many, and the rewards of the job are difficult to explain to an outsider. To a large extent, they are linked with the nebulous concepts of pride and dedication—two qualities which are developed after the fact, and cannot be included in the Game Department's job application flyer. The flyer is accurate, and necessarily brief. However, it can't explain what a game warden really does, anymore than an aviation pamphlet can tell you how to become a pilot.

The real duties, the field duties of a warden, are much more involved than those of most law enforcement officers. He or she must walk a high wire, balancing between responsibility and independence.

Perhaps the game warden's greatest responsibility is that which is fundamental to all law enforcement officers—the government-bestowed ability to deprive an American of his or her freedom. Most citizens don't realize the awesome responsibility that this involves or the judgment that is required when it is exercised.

It requires that constitutional laws be followed that were established 200 years ago and have been interpreted differently every year since. It demands a complete knowledge and understanding of these laws and how they can be enforced, since attorneys and courts debate their interpretation after the fact. But on the front line, during the fact, there is no time for debate. The warden's judgment must be swift and accurate at *all* times. There is not room for error. There is no "oops" because Humpty-Dumpty can't be put back together again. We carry a double-edged sword, which, when misused, can result in fines and possible jail for the officer.

Game wardens, in addition, are responsible to three masters: the Game Department, the county to which they

A game warden's job takes him into the field and into the water, sometimes to assist biologists, and often as part of his enforcement duties, photo by Roy Edwards.

Game wardens commonly help out Fish Division personnel with trout stocking in the spring and fall; photo by Roy Edwards.

are assigned, and themselves. The Game Department is a rather benign master. It trains them, tells them what is expected, then gives them the choice to either fish or cut bait. After a probationary period of at least nine months, the bait cutters either ask or are asked to seek employment elsewhere.

The county to which a warden is assigned is a more demanding master. Usually there is only one, in some cases two, wardens assigned to a county. To that county's residents, the game wardens are the Game Department, and when someone is fishing in their pond or trespassing upon their land—no matter what time of day—they call their game warden expecting something to be done. And the game warden goes because it is his or her job and county, and the caller needs help.

The third master is the most demanding one. It requires them to wade through frozen beaver swamps in winter and walk miles of riverbanks on sweltering summer days. It makes them sit most of the night on lonely, country roads or maintain their calm while an intoxicated boater berates them for doing his or her job. It makes one do things that no human could either ask or expect of another. That master is, of course, pride. Pride in oneself and dedication to the belief that the protection of our wildlife is worthwhile.

On the other end of the warden's balance pole is independence. There is both scheduling and environmental freedom. Although a 40-hour work week is required, within certain guidelines (game wardens work most holidays and weekends), how that 40 hours is spent is up to the warden's discretion. When work starts each day, he or she almost never knows where that day will eventually lead. The job is in a constant state of flux from hour to hour, day to day, and season to season.

The summer brings boat patrol. Lots of boat patrol, since game wardens check fish size and creel limits, boat safety equipment, and investigate boating accidents.

The fall means ducks and doves. A game warden's surroundings and focus changes from wide-open water to

beaver swamps and dove fields. With winter, the emphasis changes from the high fliers to the fast runners. Both small and big game seasons demand constant attention.

The cycle begins again in spring as the herring and striped bass begin their spawning runs in the east, and the trout start breaking the surface in the west.

Throughout the year, it is a game warden's job to protect hunters from hunters, boaters from boaters, and above all, wildlife from the greedy. But it doesn't end there. In addition to this, game wardens are expected to be public relations experts, teachers, accountants, biologists, engineers and referees.

On the high side, the public relations aspect includes giving talks to civic groups, sports clubs, and schools. On the down side, it's answering questions during lunchtime, during supper, during days off, and at night. There are radio, T.V., and newspaper interviews. And the mediation of disputes between hunt clubs.

Each year the demand for hunter education and boating safety classes increases. It's here that the warden steps into his or her role of teacher. The game warden's students range in age from six to 60, and their interests are as varied as their ages.

Every day the game warden dons his accountant's visor for the never-ending reports. A daily log must be kept of activities, and monthly, this log is compiled in detail with expenses incurred.

Since there are few game wardens, and even fewer state wildlife biologists, the warden, in many instances must double as both. Game wardens assist Department game and fish biologists in wildlife population studies and trends and are on the front line when disease shows up in animals or fish populations. Moreover, when an individual animal is injured, a warden often determines the best course of action. If possible, the animal is taken to a veterinarian, and when there is no alternative, the animal is destroyed to alleviate suffering.

And, since most counties contain at least one Game Department public boat ramp, the warden assigned to that county is also the supervisor of that ramp. He or she is expected to insure the maintenance of that ramp by either hiring contractors for minor repairs, or notifying and working with the Department's Lands and Engineering Division when major repairs are needed.

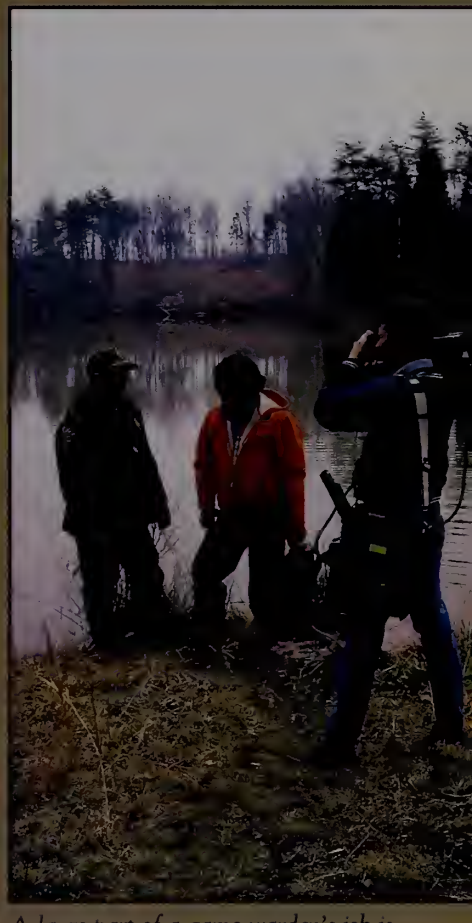
So you think you've got what it takes to become a game warden? Well, first you must meet the basic qualifications of the job which include: 1) being at least 21 years old, 2) having 20/40 or better vision in each eye (uncorrected), and 3) being a graduate of an accredited high school or equivalent certificate, G.E.D. or U.S.A.F.1. (This third requirement will change in 1992, when at least two years of college will be required.)

Next, as one of 600-700 applicants that meet these basic requirements, you must take a standard general aptitude test, called the GATB. The highest scorers on this test are then invited to take a Reid Psychological test and a physical ability test. The highest scorers on all three tests will then undergo a thorough background investigation, which includes character, criminal history and driving records. Again there is elimination of those unsuitable for the position.

In the past five years, there has been a drastic increase in Virginians taking advantage of the state's natural resources—especially our waters. In an attempt to keep from falling too far behind in its enforcement efforts, the Virginia Department of Game and Inland Fisheries is attempting to increase its warden force to two wardens per county. Every year, during the summer, the application period for game warden positions is opened, and new game wardens are hired. It is a difficult, challenging job, one that must be taken seriously, and one that is taken with pride and dedication. Think about it. If you are ready to take on the commitment, let us know. The next application period will come around sometime next summer. We would like to hear from you. □

Sgt. Cameron Gray is a Virginia game warden responsible for Amelia, Dinwiddie, Nottoway and Prince George counties.

Hunter safety and the teaching of hunter education courses is an important part of a game warden's responsibility; photo by Lee Walker.



A large part of a game warden's job is education, and this often means being interviewed by television, radio, and newspapers; photo by Roy Edwards.

FLUVANNA-RURITAN

by Spike Knuth

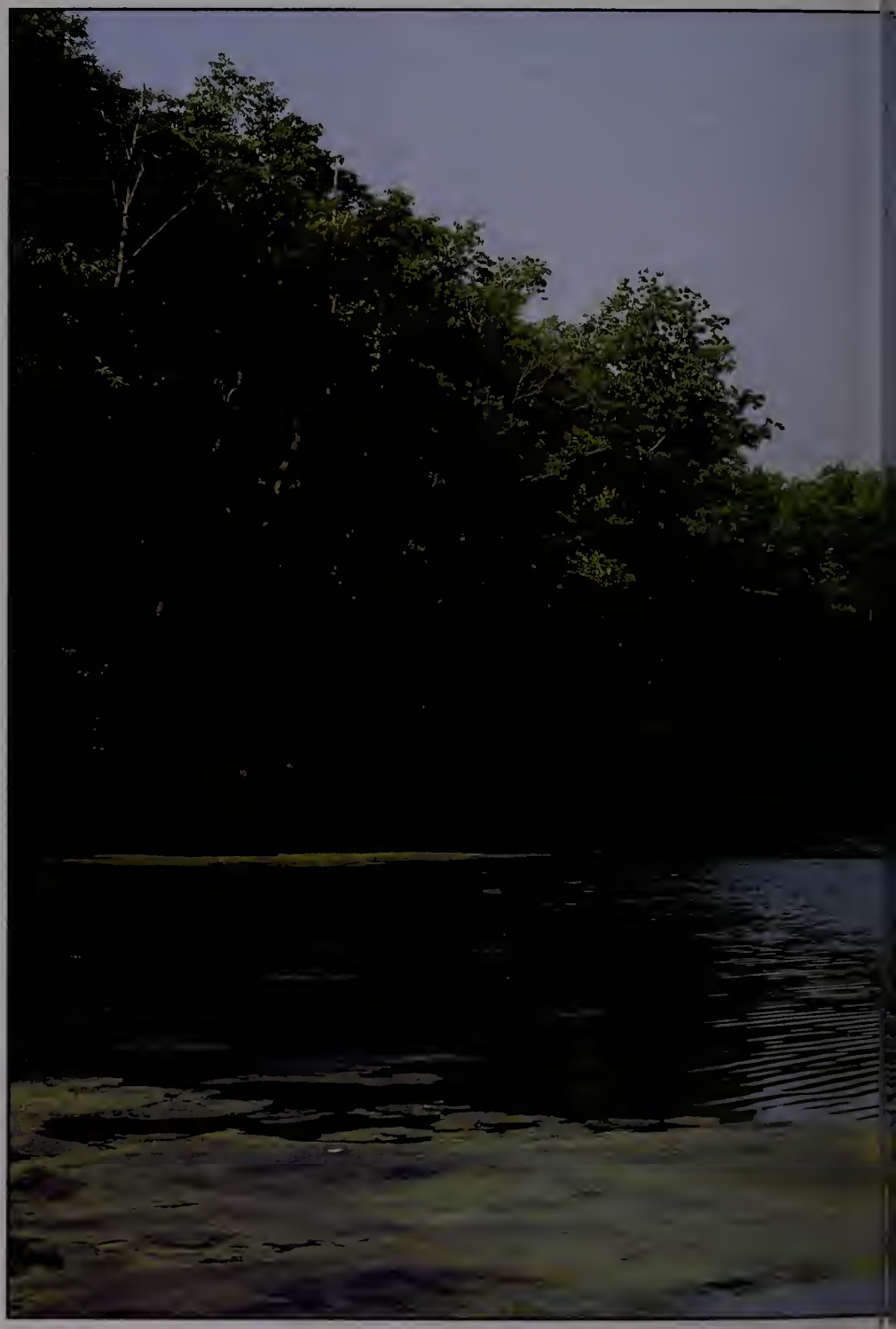
Fluvanna-Ruritan Lake in Fluvanna County had a somewhat shaky beginning. Originally completed in 1956, this Department of Game and Inland Fisheries lake was drained and refilled in 1964 after refurbishing. In 1969-70, the dam had to be repaired following the damage caused by Hurricane Camille. Since then it has become one of the more productive lakes in the north-central region.

Fluvanna Lake is over 50 acres in size with a maximum depth of 33 feet. The bulk of the shoreline is farmland, with the remainder being edged with hardwood forest. The water is generally clear, but there is an algae bloom in late-May and early-June which hinders fishing somewhat.

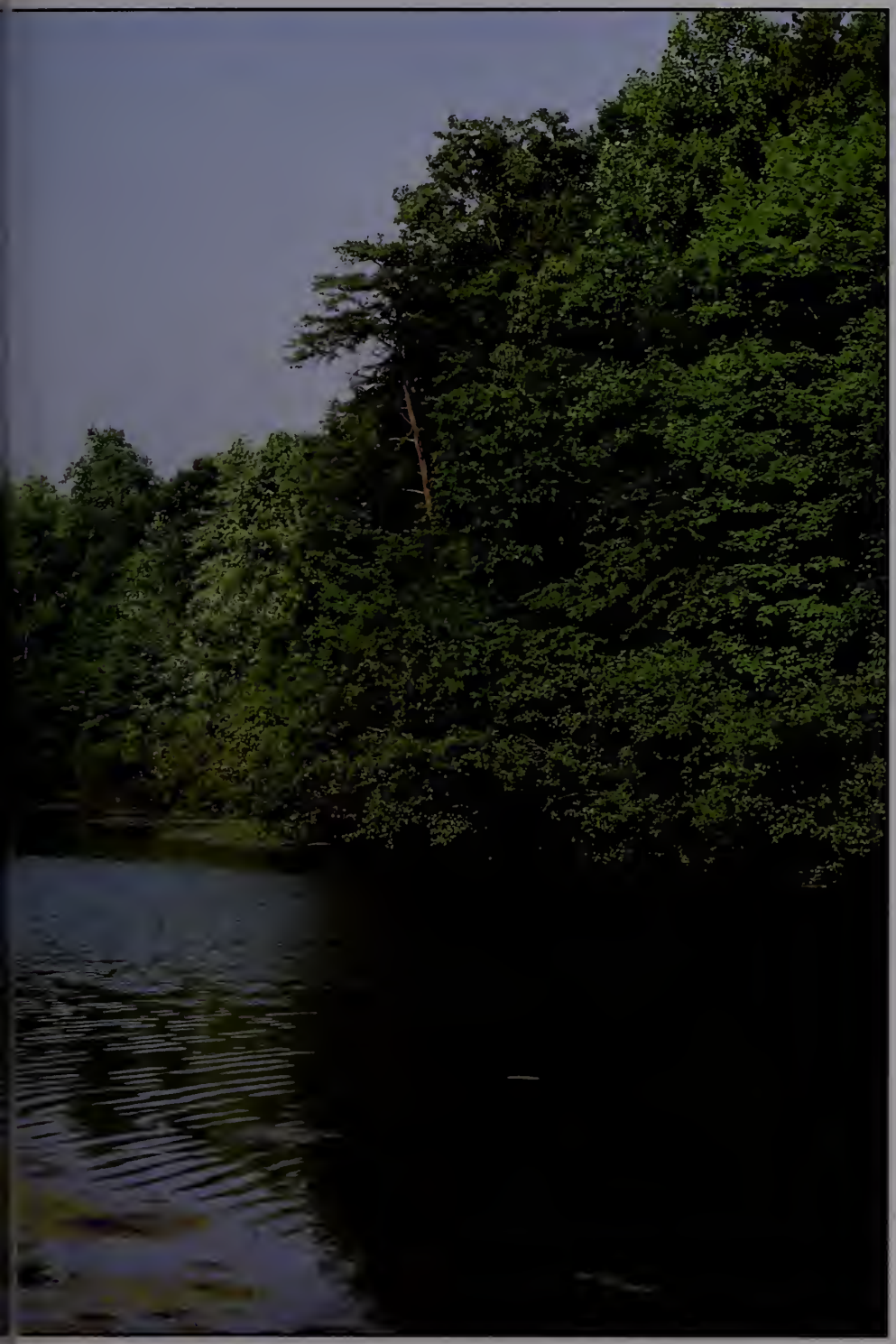
The lake contains good populations of crappie, bluegill, largemouth bass, walleye, channel catfish, redear sunfish and pumpkinseed sunfish. Regional fisheries biologist John Kauffman says that the lake is fertilized about six times a year to increase food production for fish. In six years, this program has doubled the standing crop of fish in the lake. Samples show that the lake has 200 pounds of fish per acre, according to Kauffman, making it one of the more productive lakes in the region. Two artificial fish shelters of 100 cedar trees each have been sunk into the lake and are marked by white buoys.

According to Paul St. Claire, outdoor writer and bass fisherman from Kent's Store, the lake has "good natural structure" as well. One side has steep drop-offs with trees lying down in the water, while the other side is shallow with weed beds. St. Claire likes to fish largemouth on Fluvanna. He favors plastic worms and fishes the lake year-round. He has been especially successful in late summer, right up to November. St. Claire favors the purple "reb worm" with the blue tail, and works the steep drop-offs. He points out that other anglers have good success using grubs, jig-n-pigs and a variety of crankbaits.

photo by Spike Knuth



A GAME & FISH DEPARTMENT LAKE



Crappies, too, inhabit the deeper side. Look for them around brush or downed trees in March through May. The fish shelters are good places later in the year. Minnows are the best live bait, and small jigs, grubs and spinners are the best artificials.

Don't ignore the shallow side, says St. Claire. Fish small, noisy crankbaits on the weedy shore for largemouth. For bluegills, St. Claire says that anglers have good success in spring and early summer on flyrods and popping bugs. The usual live bait—worms and crickets—are also good. Bluegills are active most of the year. In summer, bigger bluegills go deep, so look for them on the deep shoreline side. St. Claire says that the algae bloom in late-May and early-June hampers fishing somewhat, but begins to clear up toward the end of June.

Fluvanna Lake is open 24 hours a day which gives anglers a chance at the walleye population in the lake. Walleyes are normally nocturnal feeders, moving into the shallower waters at night. Usually, however, look for them in deeper water. Fish with minnows, minnow-imitating crankbaits and a variety of grub jigs or spinners. Fish deep during daylight hours and fish a little slower. Dark days tend to be better than bright days and the colder months tend to be more productive for walleyes.

Fluvanna has a 12-inch size limit on largemouth and only electic motors are allowed on the lake. Current rules and regulations are usually posted at Department lakes. There is a launch ramp, adequate parking and picnic tables at the launch area.

The lake is located in western Fluvanna County and can be reached from I-64 by taking State 15 west through Palmyra, then right (north) after crossing the Rivanna River on State 53. Look for Routes 660 and 619 as you enter Cunningham. Turn left on 619 and continue for 3.3 miles to lake entrance road—a dirt road on your right. □

Spike Knuth is the publications supervisor for the Department.

No Vacancy

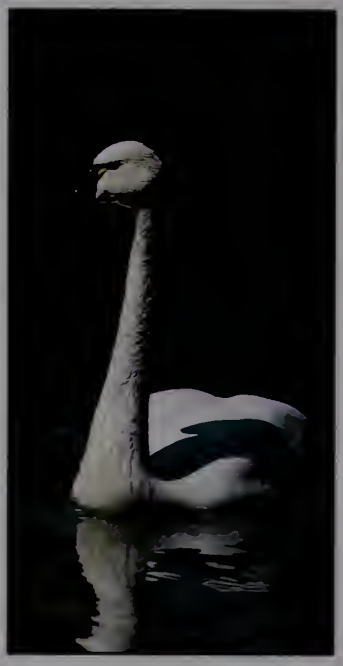
for Tundra Swans in Virginia?

Increasing numbers of tundra swans are wearing out their welcome in Virginia where they are beginning to compete with other waterfowl for limited food and space.

by Bob Gooch

We were winding up a day of Back Bay hunting, my nephew John and I. John was waiting outside the blind, gun unloaded and ready to leave. Back in the blind I was gathering up a few odds and ends, tidying it up a bit for the next party.

photo by Bill Lane



Tundra swans are on the increase in Virginia, and their numbers are causing consternation among farmers and biologists. Beautiful as they are, there is a growing concern about their damage to crops and oyster beds and their probable competition for food and space with other waterfowl.

Immediate right: *photo by Rob Simpson. All other photos pps. 18-19 by Bill Lane.*

"Over your head, Uncle Bob!" came the loud whisper. Excited, almost frantic. But the message was clear.

My gun still loaded, I came up swinging, finger on the trigger, eyes scanning the sky. Then I spotted them, a small flock of big white birds directly overhead. Swans! I pulled my swinging old scattergun off the birds. These had been on the protected list since long before I was born.

No, I didn't scold John, but I did point out to him in no uncertain words that those were swans, and *not* snow geese. The two birds are often confused, particularly by novice hunters.

The swan is a much larger bird, twice as big as a goose, but this is not as evident unless the birds are seen together—which is rare. While the greater snow goose may weigh 6 to 8 pounds, a swan may tip the scales at 10 to 18. And whereas the snow goose has an orange or red bill, feet, and legs, those of the swan are black. Finally, the neck of the snow goose is much shorter than that of the swan. The long neck of the swan is very conspicuous in flight.

Now called tundra swan, no doubt because it breeds on the vast arctic tundras of Alaska and northern Canada, the bird was for generations known as the whistling swan. Though that near disaster on Back Bay scared the daylights out of me, there was a time when the appearance of swans brought joy to the hearts of Virginia waterfowlers. Winging in and bringing a touch of the cold Arctic to the Virginia marshes, they decoyed readily to huge white decoys riding the chop of popular hunting waters. They were a waterfowling prize brought to the bag with long-barrelled scatterguns of yesteryear.

But those glorious waterfowling days came to an abrupt end when the big white birds were put on the protected list back in 1918, just as American doughboys were returning home from Europe following our first set-to with the Germans.

It was not until 1962 that the then whistling swans came back on the game bird list. Even then hunting was limited to a few western states. The

birds are now hunted in parts of Montana, Nevada, and Utah. But then an abundance of birds, crop depredation, and a growing hunting interest brought swan hunting to the East Coast, namely to North Carolina in 1984.

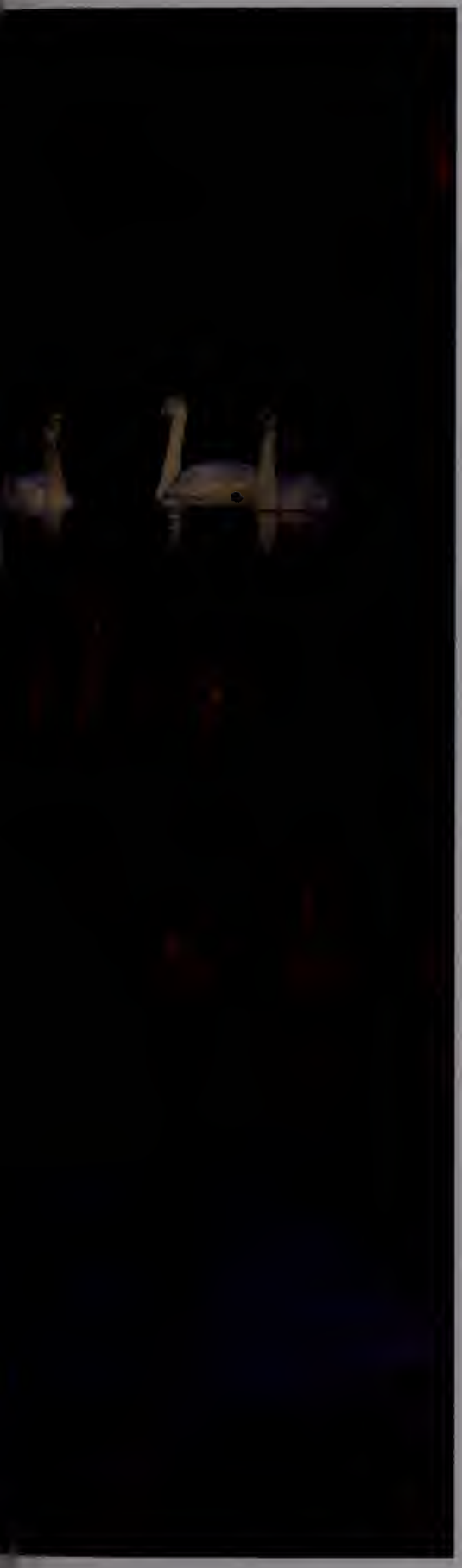
Today, there is a harvestable surplus of the eastern population of the tundra swan, and the North American Waterfowl Management Plan recommends that this population be stabilized at 80,000 birds. The current three-year average eastern tundra swan population is 87,000, and has been increasing steadily since 1948. As the number of tundra swans increases, so does the risk of competition for food and habitat with other species of waterfowl. With a limited amount of waterfowl habitat left in North America, waterfowl populations are forced to compete between species to find adequate space to breed, feed and overwinter. As more wetlands are drained, polluted or developed, this situation becomes more and more acute.

No one will question the beauty of the big white bird that played roles in the legends of Eskimos and Indians and was named whistling swan because of its mellow call resembling the tone of a wooden flute. But the bird can also be destructive when its populations are allowed to expand beyond the capacity of the remaining habitat to support them.

"Tundra swans can be destructive to oyster beds and wheat crops," says Joe May of the Virginia Department of Agriculture. Unlike geese which merely graze on winter wheat, the swan pulls it up by the roots. They also like to "puddle up," or locate a wet place in the field and turn it into a mud hole as they waddle about with their heavy bodies.

"A swan goes after clams more than it does oysters," says May. "But when it tips up to feed, it blows into the bottom looking for clams and creates holes about 2 feet across and almost a foot deep. Oysters falling into the hole are covered and smothered."

By nature, swans feed on the leaves, stems, and tubers of aquatic and marsh plants, but since the early 1970s, the birds in Virginia, Maryland, and North



The tundra swan population in Virginia is now estimated at 5,000 to 6,000 birds, and has been on the protected list since 1918 in this state; **Left:** *photo by Bill Lane,* **Above:** *photo by Rob Simpson.*

Carolina have been turning more and more to waste corn, soybeans, and other grain. They also browse on the tender shoots of winter wheat.

"The recent scarcity of aquatic vegetation in both Back Bay and the Chesapeake Bay has forced them to seek out the croplands," says Fairfax Settle, wildlife biologist with the Department of Game and Inland Fisheries.

As the Virginia populations continue to grow, control measures will undoubtedly become necessary. Limited hunting is the obvious answer. Waterfowl biologists feel we could safely harvest 500 birds from the estimated 5,000 to 6,000 birds that have wintered in Virginia in recent years.

There's room for a modest harvest, and not just for the control of the big birds. That's important, but so is the joy of waiting breathlessly in a waterfowl blind, a favorite shotgun ready, as the sparkling white birds set their wings and drop their black feet over jumbo-sized decoys bobbing on the December chop.

What's wrong with that?

Note: If the U.S. Fish and Wildlife Service grants Virginia the option of permitting a tundra swan season this year, the Game Department public hearing on August 26 at 4010 West Broad Street, Richmond will be open to a discussion of this proposal. Anyone wishing to comment on this issue may write to: Virginia Department of Game and Inland Fisheries, P.O. Box 11104, Richmond, Virginia 23230-1104. □

Bob Gooch is a well-known outdoor writer and author of the recently published Virginia Fishing Guide, *now available in local bookstores.*

What Happened To Back Bay?

by Mitchell Norman

photos by Lynda Richardson & Tim Wright

During the late 70s and early 80s, Back Bay was one of the finest freshwater sport fisheries in the nation and many would insist the best in Virginia. During this heyday, catch rates for freshwater game fishes in the bay such as largemouth bass, black crappie and bluegill were phenomenally high.

From 1978 to 1980, the average annual catch was 169,500 fish, which included 38,000 bass, 42,400 bluegill, and 64,500 crappie, and almost 80 percent of the anglers were successful in catching fish.

And this is not all for the bass fishery of those glory days. The "rest of the story" as Paul Harvey would say, is that an additional 22,500 bass were reported as caught and released each year. Largemouth bass citations

SALTWATER PUMPING IN BACK BAY
Fact and Fiction

by Mitchell Norman

There are many popular misconceptions about Back Bay, with a lot of controversy surrounding the introduction of saltwater as a means to restore the productivity of the bay. In the past, special interest groups have been instrumental in persuading the City of Virginia Beach to pump saltwater into Back Bay. However, recently, biologists have come up with the evidence to show that saltwater pumping is not what it's cracked up to be. Studies have shown that saltwater pumping is not the panacea for the bay that many believe it to be. Hopefully, the following question and answer series will help clear up these common misconceptions.

What was the original intent of the seawater pumping into Back Bay?

It was popularly believed that an increased salinity level in the bay would have the following beneficial impacts on the ecosystem: 1) an improvement in water clarity, which would allow greater sunlight penetration into the water column, thereby encouraging plant growth; and 2) provide a favorable environment for aquatic plants, especially those desirable by waterfowl. Furthermore, it was believed that the increased plant production spurred on by the increased salinity and improved water clarity would then set up a "chain reaction" effect, improving the quality of the fish and wildlife resources of the bay.

What lead people to believe this?

Prior to the mid-1930s, the ocean regularly washed across the dunes during high tides and maintained a brackish water estuary in Back Bay. In the 1930s, the barren dunes were heightened with the installation of sand fences and at the same time, the bay was turbid with little plant growth, with the fish and wildlife resources reportedly on the decline. People naturally associated these deteriorating conditions with the exclusion of seawater. What was not popularly known at the time was that the exclusion of seawater was not the main culprit (and certainly not the only one) for the decline in vegetation. The fact is that vegetation had been on the decline in Back Bay all through the 1920s, even though the salinity was fairly high. This was documented in 1932 in one of the earliest scientific studies of any substance done on Back Bay. The decline in vegetation was attributed to turbidity, which had increased tremendously in the 1920s due to extensive dredging and marsh reclamation within the Back Bay-Currituck Sound watershed. In fact, not too many years earlier, the popular belief for the loss of aquatic plants in the bay was too much salt in the water, due to open locks on the Albemarle and Chesapeake Canal.

Is there any scientific basis for the belief that increased salinity in the water would help clear it up?

Yes. The principle involved is that the negatively-charged soil particles bind with the cations of saltwater and precipitate out of solution. This is a principle which has been known for many years. Furthermore, laboratory studies by the Virginia Game Department in 1960 showed some improvement in water clarity with increased salinity, especially on clay versus silt or loam soils.

Can this principle then be applied to Back Bay?

No. The salinity/turbidity experiments conducted by the Game Department were in glass jars under laboratory conditions—not subject to all the environmental factors impacting a natural system. In the open and shallow water of Back Bay, even the smallest wind action is enough to churn the water column from the surface to the bottom, bringing back into suspension any soil particles settled out due to increased salinity or any other reason.

Were there any field studies done on Back Bay to determine if increased salinity would actually improve water clarity in its natural setting?

Not really. Game Department biologists made some general observations of increased salinity on water clarity following the 1962 Ash Wednesday storm. They noted that all areas of the bay became turbid following windy weather, regardless of the salinity level. However, areas with higher salinity

tended to clear up faster than areas with lower salinity when calm weather returned. I should point out that these general observations were not conclusive and that the role of other factors (notably, cover from vegetation and land masses) in reducing the wind force was not considered in their report.

What were the recommendations of the Back Bay-Currituck Sound study regarding salinity?

Bob Wollitz of the Virginia Game Department monitored the fish population in Back Bay from 1959 through 1961 when it was essentially freshwater and then continued his studies another year after the Ash Wednesday storm appreciably increased the salinity in the bay. In his final report, Wollitz stated:

> "The effect of an invasion of ocean water, resulting from a storm on March 7, 1962, on the existing freshwater fish populations appeared to be minor. No effect, either beneficial or detrimental, could be detected on the harvest of largemouth bass or other freshwater sport species. Largemouth bass reproduction was low in two of the areas sampled and higher than any recorded in past years in one area. The two areas of low bass reproduction had salinities of 11-13 percent of normal sea strength; while the area having high reproduction had a salinity of 9-10 percent. This could indicate that salinities in excess of 10 percent may cause reduced spawning success of largemouth bass. This information is by no means conclusive since the low reproduction encountered in two areas is comparable to other years of low reproduction in these same areas when in a fresh water condition."

Unable to determine any effects (beneficial or harmful) of the temporarily high salinity level on the freshwater fish population, Wollitz recommended that if seawater was pumped into Back Bay, that the salinity should not exceed 10 percent sea strength (SS). He arrived at this 10 percent

Agricultural runoff and the increase of sediment flowing into Back Bay from nearby land clearing have contributed greatly to the increased turbidity in the bay. Unfortunately, without a sturdy population of submerged aquatic vegetation to stabilize the bottom, the sediment stays suspended in the water, light penetration is reduced, and gone is the hope for a productive fishery.

issued for Back Bay topped off at 240 citations in 1980, which was 43 percent of all bass citations issued statewide that year. Think about that statistic for just a moment—43 percent of all the largemouth bass citations issued statewide in 1980 came from Back Bay.

And word of this terrific fishery spread fast. Anglers came from all over the country to fish Back Bay. For example, it was estimated that anglers traveled 625,000 miles in 1978 to fish the waters there. Of course, this phenomenally good fishery was of considerable economic value to the area. From 1978 to 1980, it is estimated that 46,000 anglers visited Back Bay annually, bringing $1,058,000 a year to the area.

Unfortunately, this gold mine of a freshwater fishery began a rapid decline in the early 1980s and has continued its decline up to the present day. As a result, there is virtually no freshwater fishery in Back Bay today. The number of citation bass caught in Back Bay dropped like a lead sinker from 240 in 1980 to only seven in 1985, 13 in 1986, and five in 1987. Bluegill and crappie, which were caught by the tens of thousands only a few years ago, are now seldom seen in the bay, and have been all but totally replaced by fish such as white perch, menhaden, spot and anchovies. The anglers who but a few years ago fished the bay by the thousands, now number so pitifully few that a creel survey is no longer considered justified to determine just how few anglers actually fish Back Bay. Needless to say, the marina parking lots which were full to overflowing on many days in the past are now virtual "ghost lots."

What caused this rapid and tragic decline in the bay's freshwater sport fishery in the early 1980s—this disheartening loss of an outstanding natural resource? That, my fellow Virginians, is the subject of this article. But in reality, the answer to that question can be summed up in just five words: changes in salinity and vegetation.

level from the laboratory results of bass and bluegill eggs hatching in salinities up to 10-12 SS.

Regarding the role of salinity on aquatic plants and turbidity, the Environmental Factors Report of the Back Bay-Currituck Sound Study stated:

> "Salt water is neither the panacea nor the bane that is has frequently been portrayed. Many complaints emanated from the area in the 1920s when water salinities averaged less than 10 percent SS, but they continued in the 1930s when salinities, over a broad expanse, ranged from 2 to 32 percent SS.
>
> Salinity has had important effects on the environment . . . however, the primary factors adversely affecting aquatic plant production have been turbidity and siltation. This does not imply that further consideration of salinity is not needed, for salinity is related to turbidity in a manner suggesting management possibilities. Also, salinity determines plant community types and influences certain growth and production."

When did the seawater pumping begin and has the 10 percent level been maintained?

The City of Virginia Beach began pumping seawater into Back Bay in May 1965. Until 1974, the average salinity maintained in the bay was approximately 8 percent sea strength. In 1974, the salinity began to decline, and continued to decline to freshwater conditions, where it remained until late 1978. For the next 10 years, thereafter, the salinity was maintained at approximately 10 percent sea strength.

Has the water clarity in Back Bay changed since 1965 and in what way?

Yes, drastically. As expected, there have been considerable fluctuations in water clarity from month to month due primarily to wind action. But some general observations can be made from long term trends. From 1965 through 1972, Secchi disk visibility readings (measured by lowering an 8-inch white painted disc into the water until it disappears) generally averaged

Pesticides and pollution have done their part to disrupt the equilibrium and productivity of Back Bay.

To fully understand what destroyed the fishing in Back Bay in the early 80s, one has to go back about 25 years and see how the bay has changed with time. Although one may not like to study history, it is imperative that we look at the historical changes in the bay in order to understand what happened to that excellent freshwater fishery—or to solve the mystery of "who shot Mr. Bass?"

Historically, the fish population in Back Bay has been a very dynamic one, influenced by several environmental factors. These include, but are not limited to, salinity, turbidity, vegetation, and pollution as well as commercial and sport angling. Of all these, the dominant environmental factor on the fish population (and probably on the entire ecosystem as well) has been salinity. The reason for this is simple. The amount of salt in the water determines the species which will inhabit that water and also their relative abundance. The second most important factor influencing the Back Bay ecosystem has been submerged aquatic vegetation (SAV).

To fully understand the impact of salinity and SAV on the fish population in Back Bay, it is necessary to know how much and when these have changed, and how the fish population changed with them. Since good records of salinity, SAV, and fisheries data are not available until around 1959, when the Back Bay—Currituck Sound Comprehensive Study was initiated, we will begin our story with that year.

At that time the water in Back Bay was essentially fresh (e.g. less than 2 percent sea strength (SS)), and the plant and fish communities followed suit. Submerged aquatic vegetation was fairly abundant, and water clarity was good. Largemouth bass were common in the bay, but generally recognized as "small"—mostly 12 to 14 inches. These conditions continued until 1962; then—BANG! A northeastern storm hit the area on March 7 ("Ash Wednesday") and breached the barrier sand dunes dumping a large volume of seawater into Back Bay.

After this infusion of seawater had dispersed over the bay, the salinity baywide averaged about 11 percent SS—quite a jump from the 2 percent prior to the storm! For reasons not fully understood, even by the best aquatic plant biologists, there was a resurgence of SAV (especially the more salinity tolerant species) in the bay following this storm in the spring of '62. But the resurgence was short-lived. As the water freshened, these brackish water adapted plants began to decline. By 1964, SAV was reported lower in the Back Bay than it had ever been.

How did the freshwater fish population fair with this massive influx of seawater? No fish kills were reported, but population sampling in the summer of 1962 showed poorer reproduction of largemouth bass compared with each of the three year's data prior

20-30 inches. This increased to 30-40 inches in 1973 and continued so through 1975. Visibility readings were not collected again until 1978, at which time the average was generally 20-30 inches and remained so through 1980. Since 1980, the water clarity has steadily gone downhill to readings of generally less than 8 inches in 1987.

What was the cause of these changes in water clarity?

The primary factor has been changes in the abundance of rooted, aquatic plants.

Fortunately, we have vegetation data for Back Bay for each year since 1966 (excluding 1979, 1981 and 1982). The amount of submerged aquatic vegetation (SAV) increased progressively each year from a trace amount in 1966 to 88 percent in 1973. Although the frequency of vegetation declined slightly and was somewhat variable over the next five years, the level of vegetation was still relatively high. In 1980 the amount of vegetation in Back Bay started a precipitous drop (50 percent in 1980; 14 percent in 1983; and only 8 percent in 1984). As previously noted, the highest visibility readings were found in 1973, the same year as the most abundant vegetation. Furthermore, visibility started to drop drastically in 1981, when the frequency of vegetation also started to "nosedive."

Furthermore, the lack of correlation between salinity and water clarity can be seen by comparing the high salinity readings and low Secchi disk visibilities since 1980. For the past several years, the salinity in Back Bay has never been higher since seawater pumping started in 1965; yet,the water clarity is the worst it has ever been since records were taken in 1959. The bay is more turbid now than it was in the early 1960s, prior to seawater pumping.

Did the seawater pumping help to clear up the bay?

Very little, if any. Water clarity in Back Bay did not improve appreciably until 1973 in spite of salinity levels high enough to bring about water clarity improvement as demonstrated in

The increase of housing development around Back Bay also has contributed significantly to the sedimentation and turbidity problem of the bay.

to the storm and the resultant salinity increase. Unfortunately, the data were not conclusive and even more unfortunately, the fish population survey was terminated in 1962, ending all opportunity to find out for certain what was going on.

After the storm, the barrier dunes were shored up to keep the ocean waves from overlapping the dunes into Back Bay. Following this, the bay freshened until man interfered with the natural ecosystem. In 1965, the City of Virginia Beach began pumping seawater into Back Bay, which they hoped would clear up the water and allow SAV to take root and grow. The following year, Eurasian water milfoil was first detected in Back Bay. This plant is not native to Back Bay and is turbidity tolerant. The plant had been present in Currituck Sound for years prior to 1966 and literally covered hundreds of square miles of that water body. This prolific (and often considered nuisance) plant spread rapidly in Back Bay. Where the native plants would not grow in Back Bay, milfoil thrived in the turbid water. By 1973, water milfoil covered about 88 percent of the bay. Water clarity improved dramatically from the low vegetation years of the mid-60s. Bass fishing continued to be good, but the fish caught were still "small."

From 1965 to 1974, the salinity in the bay was very erratic and averaged no more than about 8 percent SS. Then in 1974, the salinity began to drop and continued to decline until freshwater conditions once again returned. The salinity remained low until late 1978, when a new and larger pump was installed to deliver seawater into Back Bay. From that time through 1986, the salinity in the bay remained fairly uniform (with some notable exception periods) and generally aver-

laboratory experiments. The reason for this is that water clarity in Back Bay is primarily a function of wind action and the amount of aquatic plants.

Was the increased salinity in Back Bay after 1965 responsible for the increase in vegetation?

No, absolutely not. The increased abundance of aquatic plants in Back Bay following the seawater pumping was due to the introduction and spread of a non-native species, Eurasian water milfoil. The plant had been present in Currituck Sound for several years prior to its detection in Back Bay in 1966. It was simply a matter of time before this plant would spread north into Back Bay.

Did the abundance of native, brackish water plants increase in Back Bay following the seawater pumping?

This is difficult to answer since quantitative, comparable data by species is lacking. What is certain, though, is that most of the native plants did not increase appreciably in abundance until the mid-1970s, a period when the water clarity had greatly improved (thanks to the milfoil) and a time of relatively low salinity.

Is seawater pumping not necessary then for the growth of these native plants which were once abundant in Back Bay?

That has to be considered on a species by species basis. Some of the native plants (for example, widgeon grass) prefer highly brackish water, and it has been documented that the decline in widgeon grass in the 1940s was due to the reduction in salinty following the construction of the barrier sand fences. Other species, like sago pondweed, grow perfectly well in fresh water. A good example of this is Lake Shenandoah, one of our Game Department lakes, which has such an infestation with sago that chemical, and most recently biological controls, have been used to try to control it. All of the plants which have been common in Back Bay at one time or other are adapted to growing in either fresh or brackish water; some like it fresher and others like it saltier.

". . . it's going to take time for the fishery to come back. And it will require more than a reduction in salinity alone."

What was once a superb fishery and a haven for waterfowl, Back Bay has suffered from changes that has turned its once clear waters into turbid ones, and destroyed its abundant vegetation. There is still hope for the Bay, though, biologists believe, if action is taken.

Can we ever expect a return of these native plants to Back Bay in the abundance that they once were?

I would like to hope so, but I doubt it. What is needed first is improvement in the water clarity so that the plants can become established and proliferate. This most likely will never come about unless the milfoil returns to its former abundance, or another hardy, prolific, and turbidity-tolerant plant is introduced and spreads over most of the bay. Under these conditions, the water clarity may be sufficient to allow these native plants to germinate and grow to some extent; but the milfoil is so competitive for nutrients and space that the less aggressive native plants will not stand much of a chance to become widespread. It's a Catch-22 situataion.

What is needed to improve the fish and wildlife resources of the bay?

The most important step is to reduce the salinity to tolerance limits for the successful reproduction of freshwater fishes; specifically bass, bluegill, and crappie. This has been accomplished. Acting on the Game Department's recommendation, the City of Virginia Beach has discontinued pumping saltwater into the bay, and subsequently, salinity has declined to a level acceptable for the reproduction of freshwater fish.

The second step is the reestablishment of vegetation in the bay. Perhaps in time the milfoil will bounce back to its former abundance, but this is unlikely, since it has not come back in abundance in other places where it was once dominant. It may be necessary to introduce a non-native plant capable of tolerating the turbid water conditions of Back Bay. This is a matter that will involve more study and thought, which the Game Department is currently pursuing.

These are the two steps that need to be taken immediately, however, long term watershed management is also urgently needed, and should not be overlooked in any management plan to restore the bay. □

Mitchell Norman is a regional supervisor with the Fish Division.

aged more than 10 percent SS.

During this latest freshwater period, 1975-78, SAV remained dense (generally about 70 percent coverage) and water clarity excellent with the bottom visible on many occasions. With these prime conditions of clear, fresh, water and abundant SAV, freshwater fishing was excellent and locally regarded the "best ever" for the bay. But this fisherman's paradise was in for hard times as two major ecological changes took place almost simultaneously. First, the salinity increased. With the new pump installed in 1978, the City of Virginia Beach cranked the salinity in the bay up from freshwater to 10 percent SS. From that point on, the reproductive success of freshwater fish began to decline. Slowly, the largemouth bass, bluegill and crappie, which numbered in the millions in the bay, were replaced by brackish water fish such as spot, croaker and menhaden.

The second big change in the environment was the abundance of SAV. The milfoil dropped in coverage from 70 percent in 1978 to 50 percent in 1981 to 6 percent in 1986, for reasons not completely understood. With the loss of the bay's abundant SAV, there was no longer anything to stabilize the bottom of the bay. The winds quickly churned the muddy bottom up into the water column and destroyed the water clarity of the recent past. The fish populations flipped from freshwater to brackish. The "Golden Days" of Back Bay were gone, but not forgotten.

Saltwater from the ocean, which was pumped from this point into Back Bay was discontinued in 1987, after much controversy over its ability to clarify the turbid water in Back Bay.

The Game and Fish Department has since directed the City of Virginia Beach to stop pumping seawater into Back Bay, and the city has followed that recommendation. Without seawater pumping, the salinity in the bay has dropped back to freshwater conditions as of this writing. As a result, there should be some reproduction of freshwater fish this year. But it's going to take time for the fishery to come back. And it will require more than a reduction in salinity alone. We must also restore the SAV to the bay if we want to have that high quality bass, bluegill and crappie fishery of not too many years past. And we must move forward on watershed management and halt the sedimentation and pollution of the waters flowing into the bay. Back Bay—it's worth saving. □

Mitchell Norman is a regional supervisor with the Department's fish division.

Family Outdoors

Spike Knuth

photo by Lee Walker

For Kids Only?

Sunfish are for kids. Almost any small lake, farm pond, or slow moving, weedy stream contains sunfish. Now, I'm speaking of the common sunfish, dubbed *Lepomis gibbosus* by scientists. Most kids don't care about scientific names—neither do the sunfish. The common sunfish is a close cousin to the bluegill (bream), redear (shellcracker), longear, redbreast and green sunfish, but it has some subtle differences.

As their name implies, they appear to love the sun. They seem to delight in taking up residence in the sunniest spots in a lake, pond or stream. Even in hot summer, when other fish seek shade or deep water, the common sunfish can be caught in shallow, weedy, sun-drenched waters.

This is one reason why I think that sunfish are made for kids. Youngsters are usually stuck to wandering the shore to fish when they are fishing alone. The common sunfish is almost always accessible to a worm or cricket cast from shore. Plus, they can be caught about any time of the day. Kids don't worry about fishing deep points, drop-offs, channels, before the front, or on a rising barometer. They go when they can. They also don't pound the water to a froth as if it were a matter of life, death, or a reflection of their macho image. They just flat out enjoy their experience afield. They are so easily satisfied in this realm, and the common sunfish usually doesn't fail them.

The common sunfish, also known as the pumpkinseed, kiver, pond perch, robin, ruff, sunbass, or sunny, is dark, greenish-olive on its back with yellowish sides. It is spotted with orange, red and blue, and its belly is yellowish to bright orange. Its flat, platter-shaped body is lightly barred and its cheeks and gill covers are marked with alternate worm-shaped bands of blue and yellow. Its bluish-black gill cover flaps are edged in white or red with just a spot of red. Sunfish average about four to seven inches (kid-sized) with some rare ones reaching 9 to 10 inches in length.

"Sunnys" are like others in their family—the bluegills, crappies, and bass—fanning out dish-shaped nests with their tails and fins, usually over gravel bottom in one to five feet of water. A number of females may spawn in a single nest. They are very prolific and occasionally hybridize with bluegill and green sunfish, which may account for some of the different, lighter colored sunfish that are sometimes caught.

The sunfish feeds mainly on insects, small mollusks, and crustaceans. Its small mouth and throat are equipped with strong teeth for crushing shells. It will feed off the bottom with tail up, on small crustaceans.

Even though they are cooperative in summer, probably the best time to catch the scrappy sunfish is in April, when they move into the shallows, or in May or June, when they are spawning. Sometimes they'll nest right up against the shore with green sunfish and you can detect the commotion on the surface as they chase other fish away.

The sunfish is a ready striker and easy to catch. Small garden worms, red wigglers, grubs and crickets are good live baits. An ultra-light spinning rod and reel is ideal, but even a medium-weight rig works fine with light line, lightly weighted and fitted with a small bobber. Actually, sunfish aren't fussy about what they're caught on, another good reason that proves that sunfish are for kids. Just cast to openings in weeds beds, weed bed edges or gravel clearings.

Sunfish will also hit artificials with gusto. Wet flies and nymphs are especially effective, but fish them a little slower. Sunfish are inquisitive little rascals and have a tendency to swim up slowly behind a lure, studying it cautiously. On the other hand, if there is a crowd of other fish around, it may hit quickly for fear that one of its cohorts may get there first.

The common sunfish originally ranged from the Maritime Provinces and Maine to Western Ontario and Minnesota, southward to the Gulf States. Through stocking programs, the scrappy, tasty sunfish is now providing fun for all kids—even 50-year-olds like me! □

Letters

Different Views

I was amazed, befuddled, and extraordinarily defensive concerning the letter to the editor written by Kay Glymph in the June issue of *Virginia Wildlife*.

I implore her not to cancel her subscription to this fine magazine simply because she does not understand the complete reasons for its publication, and more especially, the foundation of conservation and preservation of the wild outdoors which *Virginia Wildlife* and the Department of Game and Inland Fisheries have always represented in such fine fashion.

Virginia Wildlife is exactly that. It caters to hunters and fishermen mainly because of its origin of support, but not exclusively, as she implies. I have a vast number of back issues that dwell on songbirds, wild flowers, and nongame species of animals, superbly written with delightful pictures.

Ms. Glymph must understand that this magazine and the Department could easily not exist as they presently do without the broad and sensitive nature of the people who ardently and unselfishly support them without any hesitation. I speak proudly of my fellow hunters and fishermen.

Ms. Glymph also states, "From now on my contribution will benefit organizations that operate on the premise that we conserve to benefit all humans and animals, etc."

Ms. Glymph's contributions may very well benefit some organizations, but her contributions to the Virginia Department of Game and Inland Fisheries benefit wildlife through conservation and preservation.

I ask Ms. Glymph to explore further the great fraternity of outdoors people. Please take time to visit the Department headquarters and see and hear just what these dedicated people do in the name of conservation and preservation of wildlife.

To Ms. Glymph, if you haven't seen wild turkeys, you just don't know where to look and how to find these beautiful birds. I don't know where this lady lives, but I feel sure a game warden in her area or a biologist would gladly take the time and make the effort to educate Ms. Glymph as to the ways of the wild turkey if she so desires.

I live at the foot of the Blue Ridge Mountains and I just today saw a magnificient big gobbler not 50 yards from my truck off the Skyline Parkway on a dirt road and I can name numerous other incidents of the same nature.

Ms. Glymph certainly should not put down a tradition because perhaps she doesn't completely understand all its connotations.

S.B. Kiger
Waynesboro

Good for Kay Glymph of Burke!

I don't believe you people realize that many, many of your subscribers—true lovers of wildlife—are distressed by your continual and continuing emphasis on the *destruction* of same.

Jane Hamilton
Earlysville

I am amazed at your deceptive statement in the June issue ("Letters") "that the general public does not realize how much they owe the hunters and fishermen of this nation . . . to this group of conservationists." Yes, hunters and fishermen have had a role in the conservation of wildlife—but only very selectively, i.e. sportsmen conserve wildlife that make for good sport. Period. The general public can thank the sportsmen for the overpopulation of deer which feed upon their prized ornamentals and food crops. When it's mentioned that natural predators be brought in to control these unnatural numbers of game animals, it's the sportsmen who complain the most because they fear there won't be enough animals left for them to hunt.

What is the real "shame" here, is that sportsmen have such tunnel vision. If only this "group of men and women . . . [whose] unselfish sacrifices . . .continue . . . to this day for the wildlife of this nation" would extend their concerns to the entire ecosystem, rather than only that segment which brings them pleasure.

Also, if hunting and fishing license fees pay for the publication of *Virginia Wildlife*, what is the cost of the subscription used for? The title, *Virginia Wildlife*, implies one can learn about all of Virginia's wildlife, not just Virginia's hunted wildlife; and indeed, you tend to have an article and the last page of the issue devoted to nongame animals. I think there are many non-hunting and non-fishing Virginians who care about Virginia's wildlife in its entirety and would love to see more of each issue devoted to information on the wildlife sharing your area. If the Department of Game and Inland Fisheries saw fit to concern themselves with *all* wildlife, they could sell conservation stamps to those who are not hunters or fishermen and thus not be supported "solely by the hunters and fishermen of this state."

Marlene Condon
Crozet

Virginia Wildlife *magazine operates at a deficit each year. Although this may not sound like good business sense to some, by keeping our subscription prices affordable for most Virginians, and not giving up pages to advertisers, we hope to be reaching the most people with the greatest amount of information possible each month on the state of Virginia's wildlife and recreational opportunities in the state for sportsmen. Thus, hunting and fishing licenses substantially subsidize the production of this magazine.*

Hunting and fishing licenses are often purchased by non-hunters, people who recognize the worth of the research and conservation efforts performed by the Virginia Department of Game and Inland Fisheries to benefit all wildlife in this state. In addition, the first Virginia duck stamp went on sale July 1, the proceeds of which will be used for wetland acquisition and waterfowl research and management. It is anticipated that it will again be the hunters and fishermen of the state who will largely finance this program with the purchase of this voluntary stamp.—Editor

Etc.

The Nation's Best

If you're boating in waters anywhere from Richmond to the Chesapeake Bay, you're in a great place to get in trouble. That's because you've got the best flotilla in the nation looking after your safety. The United Sates Coast Guard recently named Petersburg Flotilla 32 as the top auxiliary flotilla in the country—Number 1 among the 1,211 auxiliary flotillas. As a result, the Coast Guard has nominated the Petersburg Flotilla for the President's Volunteer Action Award.

The 21-member flotilla, part of the Fifth United States Coast Guard District, spends most of their days on the water from April to November, patrolling local waters, inspecting boats and conducting classes in boating safety. With orders from the United States Coast Guard, they regularly patrol waters from Richmond to the Chesapeake Bay, but mainly Lake Chesdin, the Rappahannock River and the Bay. The flotilla is on call 24 hours a day, seven days a week. Last year, they spent more than 1,200 hours on safety patrols. Auxiliary members use their own boats, while the Coast Guard pays for gas and oil on the rivers and bays.

The Coast Guard award selection was based on statistics kept by the Coast Guard Auxiliary Office in Washington, D.C. Records showed that the Petersburg Flotilla recorded the highest number of activities per member in the auxiliary's three main services: patrols, public information and marine safety inspections.

Free services performed by the auxiliary include: towing stalled boats, refueling, putting out fires, giving first aid, and search and rescue. In 1987, the Flotilla performed 58 rescue assists—40 on Lake Chesdin alone. Another service that auxiliary members perform is teaching boating safety classes to children and adults. They have taught over 5,000 kids so far this year.

Colonel William O. Antozzi has served as commander of Petersburg Flotilla 32 for 18 years. In addition, he has been working with the Game Department's Boating Safety Program for about four years. As boating safety officer, he was hired to organize a boating safety program which is now in place. His obvious interest, knowledge and dedication to boating and boating safety have been a real plus in strengthening Department boating safety efforts.

"We're providing a volunteer service," Antozzi said. "The Coast Guard Auxiliary as an organization consists of people who truly have the interest of boating personnel at heart. It takes a pretty special person to be willing to give many, many hours during the summer, in many cases every weekend, in service to fellow boatmen."—*Spike Knuth and Paige Smith*

1988 Virginia Big Game Contest

The Eastern Regional, Western Regional, and State Big Game Championships will be held this year in September. The Eastern Regional contest will be held on September 9 and 10 at Julius Conn Gymnasium in downtown Newport News. The entry deadline is noon on September 10. The Western Regional and State Championships will be held on September 23 and 24 at the Rockingham County Fairgrounds in Harrisonburg. The entry deadine for these contests is noon on September 24. All three contests will judge white-tailed deer in four classes: 1) 9 points and above, 2) 7 and 8 points, 3) 6 points and under, and 4) archery. Black bear and wild turkey trophies will also be judged, and Virgina Big Game Citations will be awarded. All entries must have been bagged in Virginia during the 1987-88 hunting season with a legal sporting weapon. For more information on the Eastern Regional Contest, contact Charles A. Rogers, P.O. Box 1933, Newport News, VA 23601, 804/220-3711. For information on the Western Regional and State Championships, contact Boyd E. Skelton, 412 North Main Street, Bridgewater, VA 22812, 703/828-3393 (home), 703/434-1351. The 49th Annual Big Game Contest is the only contest recognized by the Virginia Department of Game and Inland Fisheries. □

Cape Charles Wildfowl Show

The Second Annual Cape Charles Wildfowl Show will take place on August 20-21 at the Cape Charles Volunteer Fire Company Building on Mason Avenue, in Cape Charles, Virginia. The buy-sell-swap show is sponsored by the Cape Charles-Northampton County Chamber of Commerce, and features Eastern Shore carvers and artists along with artisans from other areas.

The show's hours are 10:00 a.m. to 9:00 p.m. on Saturday, August 20th; and from 10:00 a.m. to 5:00 p.m. on Sunday, August 21st. General admission is $2 per person.

For more information, contact; James Pruitt, 3 Tazewell Ave., Cape Charles, VA 23310, (804) 331-3675. □

Correction

The heat must be getting to the staff of *Virginia Wildlife*. At least, that's our excuse for our forgetfulness in the June and July issues. Our apologies first to Nancy Hugo for neglecting to credit her for her delightful *Habitat* column in June that featured bee balm. We also overlooked the credit due to Rob Simpson for his outstanding wild turkey photo in the June issue on page 5, and his mountain laurel and round-leafed birch photos on pp. 10-11 in the July issue. Apologies are also in order to Bruce Ingram for forgetting to credit him with the photos accompanying his article "After Opening Day." We *are* sorry. □

Safety

Upcoming Hunter Education Classes

Below are the hunter education classes that have been scheduled in August as of our press date. These 10-hour courses satisfy the mandatory hunter education requirement for all new hunters and those 12-15 years old. Contact the Richmond office of the Game Department at 804/367-1000 for more information and updates on any additional courses.

District 1—Central and South Central Virginia

Location: Central Library, Chesterfield
Date: August 29, 30
Time: 6:30 p.m. - 9:30 p.m.
Date: August 31
Time: 6:00 p.m. - 10:00 p.m.
Contact: Dave Folster
Phone: 804/748-1623

District 2—West Central Virginia

Location: Lynchburg Area
Date: August 8, 9, 10, & 11
Time: 7:00 p.m. - 9:30 p.m.
Contact: Earl Coppage
Phone: 804/239-3474

Location: Roanoke Elks Lodge
Date: August 17, 18, 24, & 25
Time: 7:00 p.m. — 9:30 p.m.
Contact: VA Game Dept., Vinton
Phone: 703/983-7704

District 4—Northwest Virginia

Location: Woodstock Middle School, Shenandoah
Date: August 8, 9, & 10
Time: 6:30 p.m. - 10:00 p.m.
Contact: George Mason
Phone: (703) 465-5735

District 5—North and Northeastern Virginia

Location: Bull Run Shooting Center, Fairfax County
Date: August 10, 12, & 14
Time: to be announced
Contact: Smokey Jacobs
Phone: 703/830-2344

Location: National Wildlife Fed., Vienna
Date: August 23 & 25
Time: 6:30 p.m. - 10:00 p.m.
Date: August 27
Time: 8:00 a.m. - 3:00 p.m.
Contact: Barry Lape
Phone: (703) 830-3310

Location: Parks & Recreation Warrenton-Fauquier Cty.
Date: August 27
Time: 8:00 a.m. - 1:00 p.m.
Date: August 28
Time: 1:00 p.m. - 6:00 p.m.
Contact: Kay Shackleford
Phone: 703/349-1910
Contact: Clarence Lawson
Phone: 703/275-2151

District 6—Tidewater Virginia

Location: Western Branch Community Center, Chesapeake
Date: August 2, 3, & 4
Time: 6:00 p.m. - 9:30 p.m.
Contact: Allen Crowder
Phone: (804) 421-7151

Location: S. Norfolk Community Center, Chesapeake
Date: August 16, 17 & 18
Time: 6:00 p.m.- 9:30 p.m.
Contact: Allen Crowder
Phone: 804/421-7151

Location: Western Branch Community Center, Chesapeake
Date: August 9, 10, & 11
Time: 6:00 p.m. - 9:30 p.m.
Contact: Allen Crowder
Phone: (804) 421-7151

Hunter Education Championships

Some 95 youngsters throughout Virginia participated in the 1988 Virginia Hunter Education Championship on June 17-19. The contest, sponsored by the Game Department and the Holiday Lake 4-H Center and volunteer hunter education instructors across the state, is designed to test the skills of youngsters in archery, small bore rifle and shotgun marksmanship, woodsmanship, and basic safety knowledge.

This year's winning junior team is from Nottoway County. Larry Cary coached the six team members, Rusty Leslie (who also doubled as the junior individual champion), George Felts, Matthew Williamson, Laura Williamson, and Todd Riddle.

The senior division champions are from Frederick County. Monty Loving coached Brian Carter (also the senior individual champion), Shawn Smith, James Harner, Michael Loy, and Doug Bucklew.

The winning teams will now move on to the National Rifle Association's North American Hunter Education Championships held on July 25 to 29 in Fort Indiantown, PA. We wish them luck! □

Virginia's Wildlife

The Spotted Salamander

by
Barbara Bassett
photo by
Lynda Richardson

Here's a nature quiz, brought to you by an inquisitive nine-year-old. Please identify:

- Black bug with two big eye spots. It makes a loud snap when you touch it. (Answer: Click beetle)
- Weird gobs of hair with little skulls in them. (Answer: Owl pellets)
- Two dragonflies stuck together by their tails. (Answer: They're playing piggyback)
- Handful of green jelly with black dots in it. (Answer: Spotted salamander eggs)

The green eggs of the spotted salamander *(Ambystoma maculatum)* are among those little oddities of nature usually introduced to us by children. This salamander leads a secretive life, but it leaves clues to its presence for those with eyes young enough to see them.

The egg masses, up to four inches in diameter, are found in early spring in woodland ponds and other small bodies of water. Their green color is caused by a single-celled algae. If you put an egg under a microscope, you can see flocks of algal cells swarming around the developing embryo. All spotted salamander eggs (and those of a few other amphibians) are infected with this algae, which seems to improve growth of the embryos.

The animal that produces these curious eggs seldom makes an appearance, especially not to grownups. Spotted salamanders are fairly common in Virginia, though, and are found throughout the Piedmont, coastal plains and mountains. However, they spend most of their lives underground. Safe from dehydration and predators, they burrow around hunting for food—which includes worms, spiders, snails and soft-bodied insects. Undisturbed, they can grow nearly 10 inches long and live to be 20 years old.

The only time and place you are likely to see spotted salamanders is at night during an early spring rain, in the beam of your car headlights. If you're willing to stop and get out of the car, you can easily identify them. Check for a black background, gray belly, and two rows of round yellow spots. (The only other species that comes close is the rare Easter tiger salamander, which has a lighter belly and irregular-shaped spots.)

The spot number can vary greatly. Some dedicated salamander researchers, after counting the spots on hundreds of animals, determined that the number ranged from 0 to 78, with an average of about 30.

These travelling salamanders are on the biggest adventure of their lives—the annual breeding migration. During wet weather from January to early April, they leave their underground hiding places and converge on woodland ponds, temporary pools and even tire ruts filled with rainwater. Hundreds may gather in a single location, where they engage nightly in behavior that biologists romantically call "liebesspiel," or love play.

In what is apparently a frenzy for a salamander, the male moves around the female, nudging her and sometimes swinging his head from side to side. He also deposits spermatophores on the pond bottom. These are little stalks made of jelly, which stand about one-fourth inch high and are capped by sperm. They may cover the bottom of a pond after one night of breeding activity.

When properly inspired, the female picks up a spermatophore in her cloaca. She lays her eggs in a mass, one or two days later, attaching them to branches or other debris in the pond. In about a month, the eggs hatch into that oddest of creatures, salamander larvae. The little greenish-brown larvae are about a half-inch long, with stubby legs, a tadpole tail, and luxuriant gills. They remain in the water, gradually transforming, for two to four months, and then leave at summer's end as immature adults.

The spotted salamander is one of 45 salamander species in Virginia—a large number compared with most other states. In fact, the Appalachians are something of a mecca for salamanders, having more types than any other area in the world.

For this reason, salamander conservation deserves our serious attention. Researchers have been studying the salamanders in our area for years, contributing to knowledge in scientific disciplines such as ecology, animal behavior and systematics. Salamanders may also warn us of environmental problems such as acid rain, which is seriously affecting these animals in some areas of the Northeast.

On a less serious note, salamanders are fun. They're harmless, wiggly, colorful and cute, and they eat worms like spaghetti. They'll fascinate a nine-year-old and educate any nearby adult about the natural world. If that isn't important, we're all getting entirely too old. □

Barbara Bassett is a freelance writer living in Columbia, Missouri. *The author is grateful to Dr. Joe Mitchell for his help with the factual accuracy of this text.*